

that the Cycadophyta—the most primitive of the seed-plants—sprang from the fern stock. Thus the origin of the great mass of cycadean forms which overspread the world during the Mesozoic epoch is accounted for—they were doubtless derived from the more primitive Cycad-ferns of the preceding Palæozoic age, and through them from some early filicinean ancestry. The first divergence from this original cryptogamic stock must have occurred very far back; the seeds of *Lyginodendron* and other Carboniferous seeds referable to the Cycadofilices are, as we have seen, already highly organised, and the stages of their evolution from the cryptogamic sporangium are still to be discovered.

The origin of the seed-plants from the fern phylum will probably prove to hold good for other groups besides the Cycadophyta. The great Palæozoic family Cordaitæ combines the characters of Cycads and Coniferæ, and at the same time shares certain of those anatomical features which first betrayed the true nature of the Cycadofilices. There is thus a strong presumption that the Cycadophyta, the Cordaitæ, and the Coniferæ themselves had a common origin, or at least that they all sprang, directly or indirectly, from the great plexus of modified ferns which played so large a part in Palæozoic vegetation.

Hence, so far as the gymnospermous seed-plants are concerned, we are led to the conclusion that they were derived, at a very early period, from the fern stock. The following up of the clue, which, as I believe, we have now grasped, will afford a pursuit of the utmost interest and promise.

But the other great problem—the origin of the angiospermous seed-plants, which are now supreme in the vegetable world—is as yet untouched. And so, though real progress has been made, it will be long before we can hope for a complete answer to the question which we have had before us.

THE GOVERNMENT LABORATORY.

THE report of Dr. T. E. Thorpe, F.R.S., upon the work of the Government Laboratory for the year ended March 31, 1903, with appendices, has now been published, and the following extracts from it are of interest.

It appears from the report that the descriptions of imports as given in merchants' entries are often erratic, and give no clue whatever to the real nature of the goods. For example, crushed bones were entered as "semolina," gingerbread as "paints," sodium peroxide as "fancy goods," varnish as "iron goods," whilst "machinery" and "razor strops" turned out to be tobacco fumigating powder and sugar-coated pills respectively.

Many preparations containing spirit are liable to duty also in respect of other ingredients. Soaps, for example, may contain cocoa-butter, spirit and sugar, the latter being frequently used as a cheap substitute for glycerine. Blacking and polishes are examined for sugar or molasses; confectionery for sugar and chocolate; and essences for dutiable tariff articles, in addition to spirit, such as acetic and butyric ether, used for flavouring purposes.

During the year 1173 samples of beer, wort, and brewing materials were tested for the presence of arsenic, the great majority of which were either quite free from that impurity or contained only traces; but in 44 instances the amount was so notable that the brewers were informed in the case of materials that they should not be used, and in the case of wort or beer that it should not be sent into consumption. The largest quantity of arsenious oxide found was, in malt, 1/50th of a grain per pound, in glucose, 1/40th of a grain per pound, in wort, 1/36th of a grain per gallon, and in water-softening material, 7/10ths of a grain per gallon.

No imported sample of butter has been reported as adulterated during the year. Boric acid preservative was present in 98 per cent. of the samples of butter from Australia and Belgium, 86 per cent. of the French samples, 78 per cent. of those from New Zealand, 77 per cent. of the South American samples, 45 per cent. of those from Holland, and 43 per cent. of the samples from the United States. Sixteen per cent. of the Canadian samples contained this preservative. There has been a decrease in the proportion of samples containing boric preservative

from 36.3 per cent. in 1902 to 33.5 per cent. in 1903, for which the samples from Holland are chiefly responsible.

Among articles submitted by manufacturers to the Government Laboratory was a filter which was required to deliver a sterile filtrate, but on examination was found to permit the passage of unfiltered water into the reservoir to which only filtered water was supposed to gain access. This is a danger to which insufficient attention appears to be paid by both manufacturers and users of filters. The inefficiency of many of the old filters was long since established, and as a result improvement was effected in the filtering substance, so as to secure that the water passing through should be free from all micro-organisms. In consequence of the precautions necessary where biological investigations are made, it is to be feared that in some instances, when testing the sterility of the filtrate, the filtering cylinders, cones, or candles, have been examined apart from the filter cases in which they are ordinarily fixed, and no subsequent test has been made of the filter as a whole, with its parts fitted together as in common use. Where this is so it is, of course, possible that though the filtering cylinder itself may be entirely satisfactory, its whole value may be destroyed by a faulty connection.

Among work undertaken for the Home Office was an investigation of the character of the products of combustion in gas and oil stoves. It was desired to ascertain whether along with the main products of complete combustion there was an appreciable production of carbon monoxide and acetylene. Five of the best known stoves—three gas and two oil—were experimented with, and, as a result, it was found after the stoves had been alight for some time (1) that no acetylene was produced by any of the stoves, and (2) that a small amount of carbon monoxide was a regular constituent of the products of combustion of all the stoves, the actual quantity per hour's combustion being, for the gas stoves 0.0024, 0.0048 and 0.0480 cubic foot, and for the oil stoves 0.023 and 0.032 cubic foot.

Of the gas stoves, the first two results quoted were from stoves of different type, the first being of the argand class and burning with a luminous flame, whilst in the second the burners were of the Bunsen type, and the flame impinged on skeleton non-combustible fuel. The production of carbon monoxide is greater in the oil stoves than in two out of the three gas stoves, and it emphasises the necessity of carrying off the products of combustion from every class of stove by means of a flue, if possible, or, where this actually cannot be attained, at least securing that, by good ventilation, there shall be no chance of an accumulation of these gaseous products.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE report has been issued of the commission appointed to inquire into the steps to be taken to bring into existence an institution which should form part of a teaching university for the Transvaal, and which should provide the highest training in the arts and sciences connected with mining and other industries. The commission recommends that, in establishing the proposed technical institute to form an integral part of a teaching university, simultaneous steps should be taken to lay the foundations of the university itself. Recommendations are made for the establishment of a permanent teaching institution and the acquisition of a site within a convenient distance of Johannesburg and Pretoria for a teaching university for the Transvaal, and for any other parts of South Africa which may wish to take part in the scheme. On this site should also be, besides the school of mines, the proposed agricultural school, the State laboratories for chemistry and animal and vegetable pathology. At the outset the appointment is recommended of a principal of the highest scientific attainments and proved organising capacity, with a salary of not less than 3000*l.* a year.

THE Columbia University of New York has, by an agreement with Mr. Joseph Pulitzer, undertaken to establish and conduct a school of journalism. President Eliot, of Harvard University, has proposed an outline for a practical scheme which details the subjects appropriate to a course

of study leading to the profession of journalism. But though Dr. Eliot says "that a journalist needs, more than most men, to be trained in the best methods of ascertaining truth," his scheme does not appear to include a provision for the due instruction of the future journalist in the broad principles of science, which, in view of the large part taken by scientific questions in modern life, seems an omission.

THE Commission of Inquiry into the educational systems of the United States in their bearing upon national commerce and industry, projected last year by Mr. Alfred Mosely, C.M.G., will start on October 3. The itinerary of the commission, drawn up with the assistance of President Butler, of Columbia University, embraces most of the leading educational centres in the United States. Among universities which will be visited may be mentioned Columbia, Yale, Harvard, Cornell, and Pennsylvania, and in addition to the work of these seats of learning, the commission will study the methods, equipment, and curricula of technical colleges and secondary schools for boys and girls, and be given opportunities to examine the procedure of educational institutions of special types. Each member of the commission will, we understand, be invited to record his own impressions, or to combine, if he prefers it, with others interested in the same subjects of education. In this way more varied light will be brought to bear upon all the points in American education. The reports will be printed in a volume or volumes, and distributed to educational bodies throughout the United Kingdom. In an article on the commission in the *Times*, it is stated that "the startling growth of American and German industrial competition is a fact, and a daily more alarming fact. Closely related with it, and in the opinion of many keen observers, largely responsible for it, is the fact that these are precisely the two countries in which national education of all grades has made the greatest strides, and in which its importance is most widely recognised by the people at large." These truths have long been insisted upon in these columns, and we are glad to find they are coming to be more generally appreciated, for it brings us nearer to the day when this country will be properly equipped educationally. The list of commissioners includes with others the following names:—Prof. W. E. Ayrton, F.R.S., Mr. R. Blair, Dr. J. Rose Bradford, F.R.S., Dr. Magnus Maclean, Principal Reichel, Prof. John Rhys, and Prof. W. Ripper.

THE Royal Geographical Society, in response to requests from various school authorities, recently appointed a committee to draw up syllabuses in geography to guide teachers in elementary and secondary schools in their work of imparting geographical knowledge. This committee secured the assistance of Mr. H. J. Mackinder to draw up the syllabus for secondary schools, and of the late Mr. T. G. Rooper to prepare that for elementary schools. Owing to Mr. Rooper's death, Mr. G. G. Chisholm consented to complete the revision of the latter syllabus. The course laid down for elementary schools includes first a preliminary stage for children between five and eight years, who are, it is said, best taught by reading to them suitable extracts from books of famous travellers, and accompanying the readings by the explanation, with the aid of sand-trays, &c., of geographical terms. The second stage is that for children between eight and eleven years old, and includes observational preparation with a view to the necessity of reading maps. Some observations within the reach of town children suggested are the use of the globe, the acquirement of the idea of direction and differences in elevation, and their representation on maps. Country children are, in addition, to learn the use of the compass and to compare Ordnance maps of the same district on different scales. In all study of maps the same ideas must be emphasised as in the observational work. In the third stage children of eleven to fourteen years old begin the systematic study of various parts of the world, and such subjects as climate, rainfall, temperature; the connection between geography and history are also insisted upon. The syllabus for secondary schools is divided into four years' work, and the years between thirteen and seventeen are particularly concerned—in fact, the student is supposed to have mastered the contents of the elementary schedule. In the first year

it is proposed that a portion of Britain, extending some distance from the school, should be carefully studied. The portion should be large enough to contain complete examples of river-basins, and such lengths of road and rail to show the influence of physical features on their course. The work should be correlated with instruction in elementary geology. In the second year, Britain as a whole is prescribed as the subject of study, and its several parts are to be traversed by the comparative method, the work of the first year being the standard. For the third year the subject suggested is Europe and the Mediterranean, and it is proposed that the complexion of the teaching shall depend on the other work of the school. The non-European portions of the globe are reserved for the fourth year's work. "What is essential throughout is that nothing should be taught as an isolated fact, and yet that the line of argument should be so chosen that, in the end, every essential fact . . . would have been learnt in its due setting of related facts, and in its proper perspective."

THE report of the Technical Education Committee of the Derbyshire County Council for the session 1901-2 has reached us, and contains detailed statistical information as to recent progress in secondary and technical education in Derbyshire. The statistics relating to the subject of mining are of especial interest. Prior to 1891 not more than twenty students appear to have been attending public classes in this subject, whilst the average enrolment in local classes in coal mining for the past eight years has been about 500. It is also mentioned that, whereas at the time of the initiation of the scholarship scheme in Derbyshire in 1892 only six out of sixty successful candidates were sent to schools in the county, at the present time, out of about 250 minor scholarships, 230 are being held at schools within the administrative county, and only twenty at schools outside the administrative area.

THE catalogue of books on the useful arts contained in the central library at Newcastle-upon-Tyne, which was recently published by the Public Libraries Committee of the city, is the third of a useful series of catalogues prepared by Mr. Basil Anderton, chief librarian. The catalogues provide satisfactory evidence that students residing in Newcastle have at their disposal an excellent library conducted with tact and intelligence. The useful arts dealt with in the present catalogue include all branches of agricultural, chemical, engineering, and mechanical technology, as well as many aspects of medical and domestic science. Some idea of the number of books in the Newcastle central library may be obtained from the statement that the author-list of books on the useful arts runs to 115 closely printed pages of large size.

SOCIETIES AND ACADEMIES.

EDINBURGH.

Royal Society, July 6.—Principal Sir Wm. Turner, K.C.B., in the chair.—Mr. William Murray communicated a paper on statistical evidence regarding the influence of artificial propagation upon the salmon fisheries of the American rivers.—In a paper on the origin of the pineal body as an amesial structure deduced from the study of its development in Amphibia, Dr. John Cameron showed that the epiphysis in certain types of Amphibia arose in the form of two recesses or outgrowths from the roof of the fore-brain. The right outgrowth disappeared very early by blending with the left. The latter showed most active growth, and the result of this was to cause the epiphysal opening to become situated to the left of the mesial plane in most cases. The epiphysis in Amphibia was therefore to be regarded as a bilateral, and not as a mesial, structure. These results corresponded in the main with those of Béranek, Dendy, Gaskell, Hill, and Locy in other vertebrate types.—Dr. O. Charnock Bradley communicated an elaborate paper on the abdominal viscera of *Cercocæbus fuliginosus* and *Lagothrix humboldti*.—Mr. A. Cameron Smith described his final form of apparatus for determining by a direct method latent heats of evaporation at the boiling point in electrical units. The essence of the method is to determine the electrical energy required to effect the evaporation of a measured mass of the liquid. The energy